

CLAIMS:

1. A lithographic apparatus, comprising:

- an illumination system constructed to provide a beam of radiation;
- a support structure constructed to support a patterning device, said patterning device serving to impart a cross-section of said beam with a pattern to form a patterned beam of radiation;
- a substrate table for holding a substrate;
- a projection system that projects said patterned beam onto a target portion of said substrate;
- a reference frame, with a position sensor and said substrate being located on said reference frame;
- a heat transport system having a heating element in thermal interaction with at least one of said projection system and said reference frame for heat transport to or from at least one of said projection system and said reference frame; and
- a further frame on which said reference frame is mounted, wherein said further frame is provided with a vibration isolation system having a vibration damper adapted to prevent vibrations in said further frame from affecting said reference frame, and said heat transport system being coupled to said further frame.

2. A lithographic apparatus, comprising:

- an illumination system constructed to provide a beam of radiation;
- a support structure constructed to support a patterning device, said patterning device serving to impart a cross-section of said beam with a pattern to form a patterned beam of radiation;
- a substrate table for holding a substrate;
- a projection system that projects said patterned beam onto a target portion of said substrate;
- a reference frame, with a position sensor and said substrate being located on said reference frame; and
- a heat transport system having a heating element in thermal interaction with said reference frame for heat transport to or from said reference frame.

3. A lithographic apparatus according to claim 1, wherein
said further frame defines at least a part of a vacuum chamber in which at least one of said
projection system and said reference frame are located.
4. A lithographic apparatus according to claim 2, further comprising:
a vacuum chamber enclosing at least one of said support structure, said substrate table, said
projection system, and said reference frame.
5. A lithographic apparatus according to claim 2, further comprising:
at least one heat radiation shield, located to intercept heat radiation to or from at least a part
of a surface of said reference frame.
6. A lithographic apparatus according to claim 5, wherein
said heat radiation shield is arranged to at least partially surround said reference frame.
7. A lithographic apparatus according to claim 5, wherein
said heat radiation shield is mounted on said reference frame.
8. A lithographic apparatus according to claim 1, further comprising:
at least one heat radiation shield, located to intercept heat radiation to or from at least a part
of a surface of said reference frame and wherein said heat radiation shield is mounted on said
further frame.
9. A lithographic apparatus according to claim 5, wherein
said heat radiation shield is a plate.
10. A lithographic apparatus according to claim 5, wherein
said heat radiation shield comprises at least a partially reflective surface, arranged to reflect
radiation away from said reference frame.

11. A lithographic apparatus according to claim 2, wherein
at least a part of a surface of said reference frame has at least a partially reflective surface.
12. A lithographic apparatus according to claim 5, wherein
said heat radiation shield is arranged to shield a part of said reference frame which exhibits
a stiffness which is high in relation to another part of said reference frame.
13. A lithographic apparatus according to claim 5, wherein
said heat transport system is in thermal interaction with said heat radiation shield for
transporting heat to or from said reference frame via said heat radiation shield.
14. A lithographic apparatus according to claim 1, wherein
said heat transport system comprises a supply element and an abduction element for
supplying and abducting, respectively, a fluid for transporting heat to or from at least one of said
reference frame and said projection system.
15. A lithographic apparatus according to claim 5, wherein
said heat radiation shield is provided with at least one of a thermo-electric element and a
heating element, wherein said heating element comprises a cold medium and a heat pipe to
condition said heat radiation shield.
16. A lithographic apparatus according to claim 14, wherein
at least one of said supply, abduction, thermo-electric and heating elements are mounted on
said further frame.
17. A lithographic apparatus according to claim 2, wherein
said heat transport system comprises a plurality of heat shields arranged to surround at least
a portion of said reference frame.

18. A lithographic apparatus according to claim 16, wherein
said plurality of heat shields include a top flow plate arranged to surround at least a portion of an upper surface of said reference frame, a bottom flow plate arranged to surround at least a portion of a lower surface of said reference frame and at least one side flow plate arranged to surround at least a side portion of said reference frame.
19. A lithographic apparatus according to claim 17, wherein
said heat transport system is arranged to substantially enclose a volume of a thermally insulating substance between said reference frame and said heat transport system to act as a thermal damper.
20. A lithographic apparatus according to claim 17, wherein
said heat transport system is structurally adapted to be at least one of passive and active conditioned.
21. A lithographic apparatus according to claim 2, wherein
said position sensor is directed to at least one of said patterning device and said substrate.
22. A method of manufacturing a device comprising:
providing a substrate;
providing a beam of radiation;
imparting a cross-sectional pattern to the beam and forming a patterned beam of radiation;
projecting the patterned beam of radiation onto a target portion of the substrate using a projection system supported by a reference frame, which is, in turn, supported by further frame;
using a vibration isolation system to prevent vibrations in the further frame from affecting the reference frame; and
transporting heat to or from at least one of the projection system and the reference frame using a heat transport system arranged to be in thermal interaction with at least one of the projection system and the reference frame.

23. A method of manufacturing a device, comprising:
- providing a substrate;
 - providing a beam of radiation;
 - imparting a cross-sectional pattern to the beam and forming a patterned beam of radiation;
 - projecting the patterned beam of radiation onto a target portion of the substrate using a projection system supported by a reference frame; and
 - transporting heat to or from the reference frame using a heat transport system arranged to be in thermal interaction with the reference frame.
24. A lithographic apparatus, comprising:
- an illumination system having a lens and providing a beam of radiation, said projection beam having a cross-section;
 - a support structure supporting a patterning device, said patterning device serving to impart said cross-section of said beam with a pattern and forming a patterned beam;
 - a substrate table for holding a substrate;
 - a projection system that projects said patterned beam onto a target portion of said substrate;
 - and
 - a vacuum chamber enclosing at least one of said support structure, said substrate table, and said projection system, said vacuum chamber including a base frame on which at least one a plurality of components of said apparatus which may cause motion or heat to be generated in said apparatus, is mounted.
25. A lithographic apparatus comprising:
- means for providing a beam of radiation;
 - means for imparting the beam with a predetermined cross-sectional pattern to form a patterned beam;
 - a substrate;
 - means for projecting the patterned beam onto a target portion of said substrate;
 - a reference frame on which at least one position sensor for at least one of said means for forming a patterned beam and said substrate, and said means for projecting being located; and
 - means for transporting heat to or from said reference frame.